exact counterpart of a true anginal attack, but I have never seen such a case die. Almost without exception, prompt giving up of the drug in persons who have developed tobacco angina is followed almost, if not quite immediately, by a cessation of the attacks. I have seen no treatment in true angina which is so successful.

Coffee angina is much more frequent in advertising literature than in medical reports.

I have never seen a case of angina caused by the abuse of tea. I believe, nonetheless, that they do occur, but probably in very small numbers, save in populations which consume tea in greater abundance than is customary in the localities in which I have practiced. English and Canadian colleagues have described cases to me.

In all the toxic anginas almost immediate relief follows the elimination of the causative drug. Insofar as I can determine in none of the cases are any permanent lesions developed and the only treatment necessary is abstention from the drug.

Nearly every practitioner of years of experience has found families on his list who show a very definite family tendency toward the complex. It has been the most frequent manner of exitus in my own family for three generations, at least.

SENESCENCE AND REJUVENESCENCE FROM A BIOLOGICAL STANDPOINT [1]

(ABSTRACT)

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In the simpler multicellular organisms senescence becomes evident as a decrease in respiratory metabolism and rate of growth. It may lead to death, but in many forms it leads to some process of asexual reproduction with re-

[1] The Harvey Lecture. Delivered October 11, 1928.

juvenescence, and death does not occur. In general in such organisms rejuvenescence occurs in the reorganization accompanying the formation of new individuals by budding, fission, etc. from parts of the original body, or by extreme starvation. In consequence of such rejuvenescence such organisms have no definite length of life and their physiological age cannot be measured in terms of time.

In the higher animals and man senescence shows the same general characteristics as in the simpler organisms, but the capacity of the body cells for rejuvenescence is narrowly limited under any known conditions. Changes which appear to constitute a slight degree of rejuvenescence can probably be brought about in various ways in man and the higher animals, but they are at best very slight.

Senescence is not a phenomenon of later life, but is going on from early developmental stages. In fact the organism is growing old most rapidly when it is youngest. Senescence apparently consists in accumulation of more or less inert products of metabolism and in progressive changes in protoplasms which make them less capable of maintaining metabolism and growth. Life, so to speak, clogs its own machinery. When conditions are so altered that previously accumulated inert substances are decomposed and removed and the protoplasmic changes of senescence are reversed, rejuvenescence occurs.

Various other periodic or cyclic phenomena in organisms appear to be fundamentally similar to senescence and rejuvenescence of the individual. The egg and the sperm, for example, are apparently highly differentiated, physiologically old cells nearing death from old age. Fertilization, however, initiates a process of rejuvenescence. In the early stages of embryonic development the organism is growing young, as various lines of physiological investigation have shown, and it is youngest, not at the beginning of development, but at a later embryonic stage.

There is some evidence that even in the unicellular organisms and in the cells of multicellular forms there may be some slight senescence in the period between successive divisions and that this is more or less completely compensated in the processes of division. The cycle of activity of various gland cells such as the pancreas cell resembles in certain respects an age cycle. The period of loading of the cell is a period of accumulation of substance and decreasing metabolism, the period of discharge, a period of dedifferentiation and increasing metabolism.

Senescence and rejuvenescence are biological terms which designate certain aspects of the equilibration process which constitutes life. They undoubtedly include a wide range of physicochemical changes which differ in character in different organisms. What these changes are we shall learn only as we learn what protoplasms and life are.

LIVER AND BILIARY PASSAGES[1]

(ABSTRACT)

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Although the liver is the largest organ in the body, and has probably a greater amount of duties than any other organ, still it is remarkably free from changes which are the direct result of age; no important organ is more so. This is due largely to the peculiar blood supply of the liver and the practical absence of arterial degeneration. We hear a lot about senile degeneration of the heart muscle and of the arteries and of senile changes in the kidneys and the brain, but we do not hear much about the senile liver. Any changes in function produced are very much less clear and definite.

Even in the digestive tract there is a marked contrast between the liver and other organs. We know what eld-

[1] Delivered October 12, 1928.